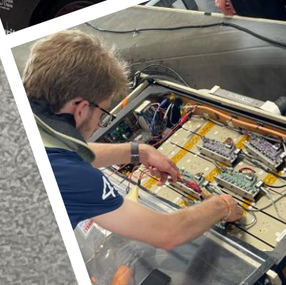
INNOVATORS EDUCATIONAL FOUNDATION

Innovators Educational Foundation (IEF) is a 501c3 nonprofit that organizes the US collegiate solar car events. IEF is made up of a core group of dedicated volunteers, mostly former competitors, that know first-hand the value of a hands-on, multidisciplinary, innovative project to the educational experience. In addition to experiential learning, these solar car events promote energy efficiency and raise public awareness of the capabilities of solar power.

#3 University of Kentucky
#4 Massachusetts Institute of Technology
#5 University of Florida
#6 University of California Berkeley
#8 The University of Texas at Austin
#9 Iowa State University
#11 Northwestern University
#13 Michigan State University
#17 Illinois State University
#22 University of Illinois at Urbana-Champaign
#26 University of British Columbia
#32 Principia College
#35 University of Minnesota Twin Cities
#49 Georgia Institute of Technology
#55 Polytechnique Montréal
#65 University of Calgary
#77 University of Toronto
#87 University of Virginia
#99 North Carolina State University
#101 École de Technologie Supérieur (ETS)
#785 University of Kansas
#786 Western Michigan University
#828 Appalachian State University

americansolarchallenge.org

OREGON NATIONAL HISTORIC TRAIL 2022



If you are interested in forming a team to participate in future events or providing support to the program as an event partner, sponsor, or volunteer, please contact us!

Innovators Educational Foundation
1028 S Bishop Ave #314, Rolla, MO 65401
ief@americansolarchallenge.org

American Solar Challenge

Formula Sun

American Solar Challenge

EVENT PARTNER

OREGON TRAIL NATIONAL HISTORIC TRAIL

TRACK PARTNER

HEARTLAND MOTORSPORTS PARK

SILVER SPONSORS

ALTAIR

BLUE ORIGIN

IOSi

The MathWorks™

TESLA

BRONZE SPONSOR

The Eberle Trust

SUPPORTERS

AED.US
Evan Stumpges
Siemens Software
Porch.com
InspectionSupport.net
HireaHelper.com

Welcome!

Promoting educational excellence and engineering creativity, the American Solar Challenge (ASC) and Formula Sun Grand Prix (FSGP) are collegiate student design competitions. Teams from the US, Canada, and around the world design and build solar-powered vehicles within a set of regulations. Once at the event, these vehicles are put through a series of inspections, a process known as scrutineering. Teams that successfully pass scrutineering and qualify during the track event will then take on the 1400+ mile journey following the Oregon National Historic Trail.

Schedule

16 DAYS OF EVENTS

SCRUTINEERING JULY 1-4

The solar cars undergo a series of inspections covering all aspects of the car, including electrical systems, mechanical systems, body and sizing, dynamic testing, and more. Inspectors check that the solar cars are built in alignment with the regulations and have all required safety features. Passing scrutineering is a big accomplishment for the teams and a requirement to participate in the track and road events.

FORMULA SUN GRAND PRIX JULY 5-7

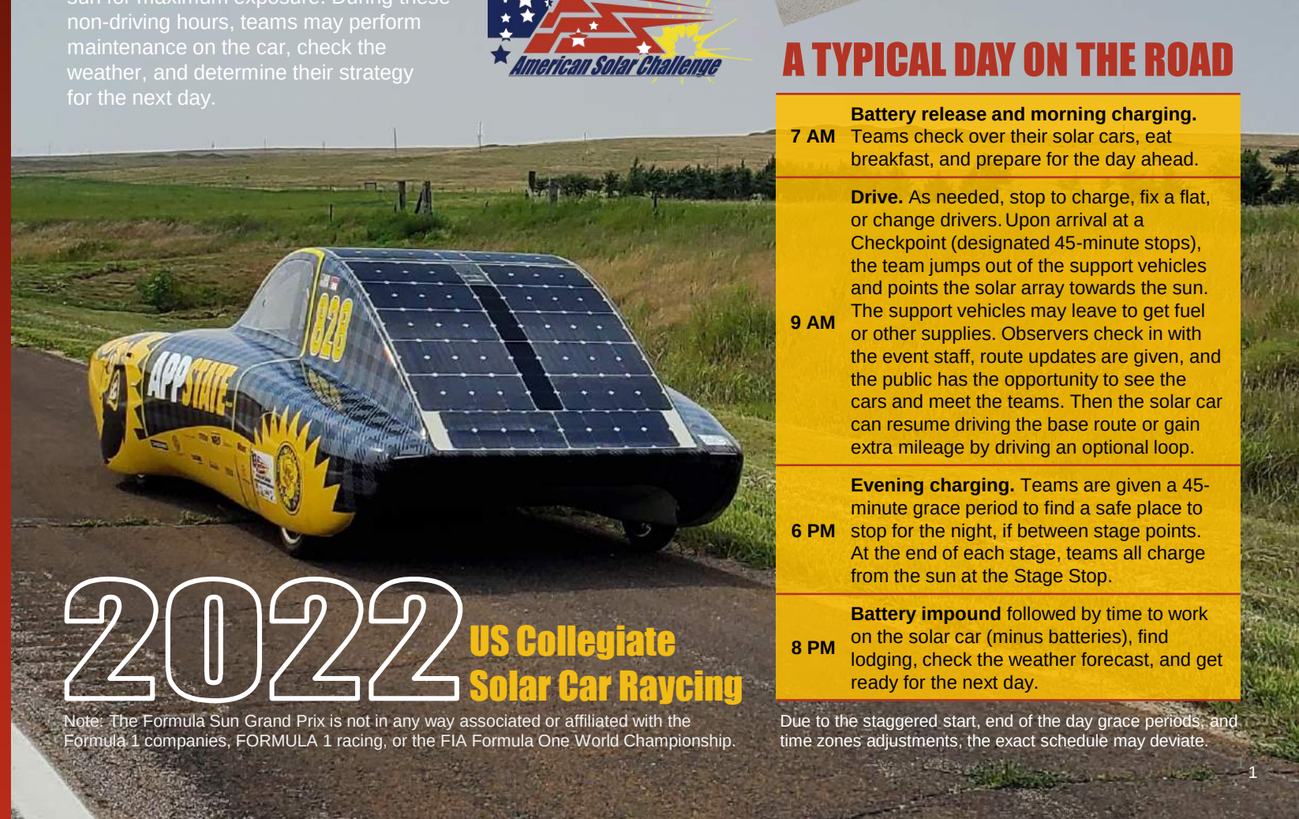
Teams aim to complete as many laps as possible in the allotted 24 hours of driving time during this 3-day, road-course track event. Teams strategize their pit stops for driver and tire changes, all while carefully monitoring the weather and managing the car's energy from the sun. Solar cars that complete a minimum number of laps qualify to participate in the American Solar Challenge.

PUBLIC DISPLAY DAY JULY 8

See the solar cars on display at Independence Square. The multi-occupant vehicles will also go through practicality judging, which is a factor in their final score.

AMERICAN SOLAR CHALLENGE JULY 9-16

With a goal to complete as many miles as possible in the lowest overall elapsed time, all solar car teams will be traveling the base route of 1400+ miles along the Oregon National Historic Trail. Teams that have extra energy available can drive optional challenge loops at select locations to further demonstrate the capabilities of their solar cars. Each solar car is escorted by lead and chase vehicles that carry the other team members and equipment for roadside repairs. For two hours each morning and evening, teams are able to charge their batteries using the car's solar array, angling the array toward the sun for maximum exposure. During these non-driving hours, teams may perform maintenance on the car, check the weather, and determine their strategy for the next day.



2022 US Collegiate Solar Car Raycing

Note: The Formula Sun Grand Prix is not in any way associated or affiliated with the Formula 1 companies, FORMULA 1 racing, or the FIA Formula One World Championship.

A TYPICAL DAY ON THE ROAD

7 AM	**Battery release and morning charging.** Teams check over their solar cars, eat breakfast, and prepare for the day ahead.
9 AM	**Drive.** As needed, stop to charge, fix a flat, or change drivers. Upon arrival at a Checkpoint (designated 45-minute stops), the team jumps out of the support vehicles and points the solar array towards the sun. The support vehicles may leave to get fuel or other supplies. Observers check in with the event staff, route updates are given, and the public has the opportunity to see the cars and meet the teams. Then the solar car can resume driving the base route or gain extra mileage by driving an optional loop.
6 PM	**Evening charging.** Teams are given a 45-minute grace period to find a safe place to stop for the night, if between stage points. At the end of each stage, teams all charge from the sun at the Stage Stop.
8 PM	**Battery impound** followed by time to work on the solar car (minus batteries), find lodging, check the weather forecast, and get ready for the next day.

Due to the staggered start, end of the day grace periods, and time zones adjustments, the exact schedule may deviate.

MEET THE TEAMS

Representing a variety of universities and colleges, these teams have taken on the nominal 2-year project of designing, building, and testing a solar powered vehicle to prepare for competition. The teams are split into two classes for the events.

2 classes

Single-Occupant Vehicles (SOV)

- Seats 1 person
- Smaller allowable solar array size
- Batteries are limited by weight
- No recharging via external sources (penalty would be incurred)
- Scoring is based on the official distance completed, including any penalties incurred. (Ties are determined by the lowest overall elapsed time.)

Multi-Occupant Vehicles (MOV)

- Seats 2 or more people
- Larger allowable solar array size
- No limit on amount of batteries
- Recharging via external sources is allowed and energy is metered
- Scoring is a combination of an energy efficiency score (people-distance, time, and external recharging) and a practicality score
- Targeting an average speed of at least 35mph (ASC) and 30mph (FSGP)

University of Kentucky
#3 Gato del Sol VI

L x W x H: 5.00m x 1.74m x 1.14m
Weight: 247kg
Array: 970W SunPower Silicon
Batteries: 4.5kWh Li-Ion (20kg)
Motor: 2 Mitsuba 2096D3
Wheels: 4 Aluminum 16“
Chassis: Aluminum-Fiberglass Composite

MIT
#4 Nimbus

L x W x H: 4.06m x 1.60m x 1.02m
Weight: 202kg
Array: 987W SunPower Silicon
Batteries: 4.9kWh Li-Ion (20kg)
Motor: 1 Mitsuba 2096D-II
Wheels: 4 GH Craft Composite 16”
Chassis: Carbon Fiber/Aluminum Honeycomb

Iowa State University (PrISUm)
#9 Eliana

L x W x H: 4.98m x 1.12m x 2.10m
Weight: 476kg
Array: 1283W Sunpower Si/Spectrolab GaAs
Batteries: 16.9kWh Li-Ion (71.2kg)
Motor: 2 Mitsuba M2096-III
Wheels: 4 Bridgestone Ecopia 16”
Chassis: Carbon Fiber Semi-monocoque

Northwestern University
#11

L x W x H: Not provided
Weight: Not provided
Array: Not provided
Batteries: Not provided
Motor: Not provided
Wheels: Not provided
Chassis: Not provided

University of British Columbia
#26 Daybreak

L x W x H: 4.50m x 1.40m x 1.00m
Weight: 160kg
Array: 1022W SunPower Silicon
Batteries: 5.1kWh Li-Ion (20kg)
Motor: 1 New Generation Motor (NGM)
Wheels: 4 Aluminum 14”
Chassis: Chromoly Steel Space Frame

Principia College
#32 RA XI

L x W x H: 3.90m x 1.80m x 1.07m
Weight: 170kg
Array: 800W SunPower Silicon
Batteries: 4.0kWh Lithium Polymer (20kg)
Motor: 2 Mitsuba
Wheels: 4 Carbon Fiber 16”
Chassis: Chromoly Steel Space Frame

University of Florida (Solar Gators)
#5 Sunrider

L x W x H: 5.00m x 1.00m x 1.50m
Weight: 330kg
Array: 1000W SunPower Silicon
Batteries: 5.0kWh Li-Ion (20kg)
Motor: 1 Mitsuba
Wheels: 4 16”
Chassis: 4130 Steel Space Frame

U of California, Berkeley (CalSol)
#6 Excalibur

L x W x H: 4.82m x 1.60m x 1.31m
Weight: 166kg
Array: 1010W Maxeon-Sunpower Silicon
Batteries: 4.3kWh Li-Ion (20kg)
Motor: 2 Mitsuba M1096D-III
Wheels: 4 Tubeless 16”
Chassis: Composite Monocoque

UT Austin (Longhorn Racing Solar)
#8 Lone Star

L x W x H: 4.90m x 1.33m x 0.85m
Weight: 158kg
Array: 900 Maxeon Technologies Silicon
Batteries: 4.6kWh Li-Ion (20kg)
Motor: 1 Mitsuba
Wheels: 4 Mitsuba 16”
Chassis: 6061 Aluminum Monohull

Michigan State University
#13 Aurora

L x W x H: 4.20m x 1.75m x 1.10m
Weight: 680kg
Array: 1138W SunPower Silicon
Batteries: 13.1kWh Li-Ion (50.7kg)
Motor: 1 Mitsuba / Nomura Co BLDC
Wheels: 4 Custom Alumnium 16”
Chassis: Chromoly Steel Space Frame

Illinois State University
#17 Mercury 6

L x W x H: 4.50m x 1.40m x 1.10m
Weight: 220kg
Array: 800W SunPower Silicon
Batteries: 5.2kWh Li-Ion (20kg)
Motor: 1 Mitsuba
Wheels: 4 Carbon Fiber 18”
Chassis: Carbon Fiber Monocoque

U of Illinois at Urbana-Champaign (Illini)
#22 Brizo

L x W x H: 5.00m x 1.20m x 1.00m
Weight: 192kg
Array: 1000W SunPower Silicon
Batteries: 5.2kWh Li-Ion (20kg)
Motor: 1 Mitsuba
Wheels: 4 GH Craft Carbon Fiber 16”
Chassis: Semi-Monocoque Carbon Fiber Panel

University of Minnesota Twin Cities
#35 Freya

L x W x H: 5.00m x 1.90m x 1.20m
Weight: 531kg
Array: 1000W SunPower Maxeon Silicon
Batteries: 10.5kWh Li-Ion (85kg)
Motor: 2 Custom Brushless In-house
Wheels: 4 6061-T6 Aluminum 22”
Chassis: Carbon Fiber Monocoque

Georgia Institute of Technology
#49 Endurance

L x W x H: 5.00m x 1.25m x 1.20m
Weight: 200kg
Array: 895W SunPower Silicon
Batteries: 4.7kWh Li-Ion (20kg)
Motor: 2 Marand
Wheels: 4 GH Craft Carbon Fiber 16”
Chassis: 4130 Steel Space Frame

Polytechnique Montréal (Esteban)
#55 Esteban 10

L x W x H: 4.90m x 1.85m x 1.25m
Weight: 330kg
Array: 1271W SunPower Maxeon Silicon
Batteries: 9.2kWh Li-Ion (46.6kg)
Motor: 2 Mitsuba M2096D-III
Wheels: 4 Carbon Fiber 16”
Chassis: Composite Material Sandwich Panels

nps.gov/oreg

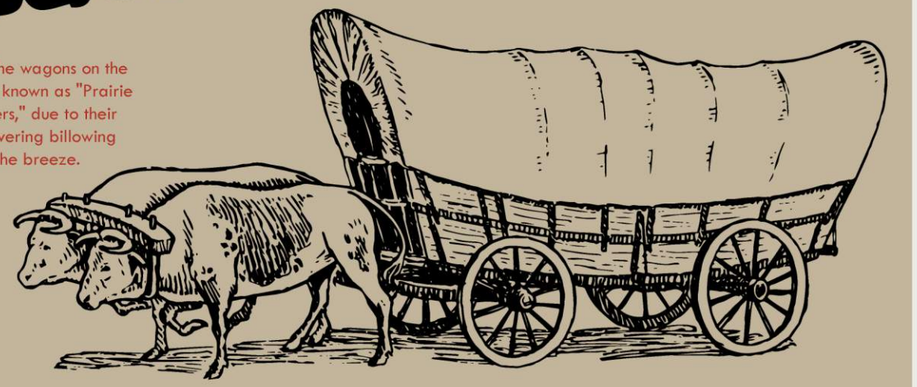
THE TRAIL TO OREGON!

July 9-16, 2022

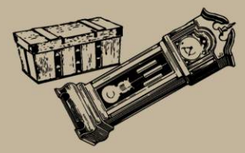
By 1859, over 50,000 people had followed the old trail, carrying Oregon to statehood that year!

In 1978, Congress designated the route as the Oregon National Historic Trail.

Most of the wagons on the trail were known as "Prairie Schooners," due to their cloth covering billowing in the breeze.



Heavy items in the wagons often ended up left along the trail.



Miles of trail ruts and traces can still be seen along the Oregon National Historic Trail, reminders of the sacrifices, struggles, and triumphs of early American settlers and the diversity of the lands and cultures they encountered.

The 2022 American Solar Challenge will follow portions of the Oregon Trail and other national historic trails from Missouri to Idaho!

Instagram @NationalTrailsNPS
Facebook @OregonTrailNPS

Nebraska's Chimney Rock served as a natural landmark along the Trail.

Though slower than horses and mules, oxen were better suited for pulling fully-loaded wagons.

Independence, Missouri, was one of many landings where emigrants of the mid-1800s "jumped off" onto the overland wagon trails.

Families encountered an assortment of animals, like the Prairie dog, as they made their way west across the open prairie.

DID YOU KNOW?
Independence, Missouri, to Twin Falls, Idaho, is approximately 2,000 miles!

Oregon City, OR
Trail's End
While the American Solar Challenge ends in Idaho, Oregon Trail travelers continued into Oregon to places such as the Blue Mountains, The Dalles, Columbia River, and finally the Willamette Valley. If you reach the end of the trail, visit the End of the Oregon Trail Interpretive Center.

Twin Falls, ID
Herrett Center for Arts & Science
The Herrett Center for Arts and Science is a non-profit museum on the main campus of the College of Southern Idaho. The solar cars will be on display at the end of the race.

Pocatello, ID
Historic Downtown Pocatello
The Oregon Trail enters the high desert of southeastern Idaho and winds northwest along the Bear River. It passes through Pocatello before turning west to meet the Snake River. Wagon trains formed an arc across the southern part of the state.

Montpelier, ID
National Oregon/California Trail Center
The center offers visitors a unique and entertaining interpretive indoor adventure; simulating an actual wagon train experience of the 1850s.

Lander, WY
Fremont County Pioneer Museum
Lander was north of South Pass, a mountain crossing so gentle that most did not even realize they had entered the Pacific watershed — the Oregon Country!

Casper, WY
National Historic Trails Interpretive Center
The trail continues into central Wyoming and present-day Casper before separating from the North Platte and heading southwest.

Gering, NE
Scotts Bluff National Monument
Towering 800 feet above the North Platte River, Scotts Bluff served as a landmark for travelers on the Oregon, California, Pony Express, and Mormon trails.

Grand Island, NE
Stuhr Museum of the Prairie Pioneer
Wagons moved along both sides of the gritty Platte River, which takes its name from a French word meaning "flat."

Topeka, KS
Brown v. Board of Education National Historical Park
Hundreds of African Americans, free and enslaved, traveled the overland trails seeking freedom and opportunity more than 100 years before the U.S. Supreme Court decision to end segregation in schools.

Independence, MO
Independence Square
The location of frenzied outfitting activity, Independence Square was the last significant point of supply for emigrants until the mid-1840s, when Westport also became an outfitting town. Look for statues of US presidents, historical markers and monuments, and interpretive exhibits.

NATIONAL PARK SERVICE

American Solar Challenge Stage & Checkpoint Stops
Oregon National Historic Trail

MEET THE TEAMS Continued...

OR START YOUR OWN!

The field of universities with solar car teams continues to grow. The solar car project provides a great multi-disciplined experience for today's students that will become tomorrow's leaders. FSGP/ASC events are open to university/college teams from around the world. Join these universities and more at the next event!

University of Calgary
#65 Schulich Elysia

L x W x H: 4.50m x 1.80m x 1.17m
Weight: 545kg
Array: 1200W SunPower Silicon
Batteries: 18kWh Li-Ion (69.1kg)
Motor: 2 Marand BLDC
Wheels: 4 Alloy 16”
Chassis: Carbon Fiber Monocoque

University of Toronto (Blue Sky)
#77 Borealis

L x W x H: 5.00m x 1.18m x 1.03m
Weight: 180kg
Array: 1100W SunPower Silicon
Batteries: 5.25kWh Li-Ion (20kg)
Motor: 1 Mitsuba
Wheels: 4 Aluminum Alloy 16”
Chassis: Carbon Fiber Monocoque

University of Virginia
#87 Rivanna 2

L x W x H: 5.00m x 1.65m x 1.16m
Weight: 270kg
Array: 900W SunPower Silicon
Batteries: 4.9kWh Li-Ion (20kg)
Motor: 1 Mitsuba
Wheels: 4 Aluminum 16”
Chassis: 1020-alloy Steel Space Frame

NC State (SolarPack)
#99 SPX

L x W x H: 4.15m x 1.74m x 1.44m
Weight: 1003kg
Array: 600W SunPower Silicon
Batteries: 20.6kWh Li-Ion (98.6kg)
Motor: 1 Emrax 228
Wheels: 4 BMW i3 19”
Chassis: Steel Monocoque

École de Technologie Supérieur (Éclipse)
#101 Éclipse 11

L x W x H: 4.40m x 1.50m x 1.10m
Weight: 180kg
Array: 1000W SunPower Silicon
Batteries: 5kWh Li-Ion (20kg)
Motor: 1 Marand
Wheels: 4 Carbon 16”
Chassis: Carbon Fiber Monocoque

The University of Kansas (KU)
#785 Astra

L x W x H: 3.76m x 1.23m x 1.02m
Weight: 304kg
Array: 704W SunPower Silicon
Batteries: 5kWh Li-Ion (20kg)
Motor: 2 QS
Wheels: 4 Draglite 15”
Chassis: 4130 Chromoly Steel Tube

Western Michigan University (Sunseeker)
#786 Aethon

L x W x H: 3.80m x 1.70m x 1.15m
Weight: 375kg
Array: 992W SunPower Silicon
Batteries: 5.1kWh Li-Ion (20kg)
Motor: 1 Marand
Wheels: 4 Moped 16”
Chassis: Carbon Fiber/Kevlar Monocoque

Appalachian State (Team Sunergy)
#828 Rose

L x W x H: 4.74m x 2.10m x 1.24m
Weight: 500kg
Array: 1212W SunPower Silicon
Batteries: NMC (140kg)
Motor: 2 Mitsuba M2096-D3
Wheels: 4 Custom Aluminum 16”
Chassis: Carbon Fiber/Kevlar Sandwich

OREGON

The challenge of the American Solar Challenge begins long before the solar cars head West on the Oregon Trail.

A solar car team effectively acts as a small business – attracting sponsors, managing public relations, developing and executing a project plan, and, yes, producing a solar powered vehicle.

In addition to the design and build of the solar car, teams must also plan for the logistical challenges of traveling with a team for more than 2 weeks – lodging, meals, support vehicles, safety equipment, and more.

More THAN JUST ENGINEERING

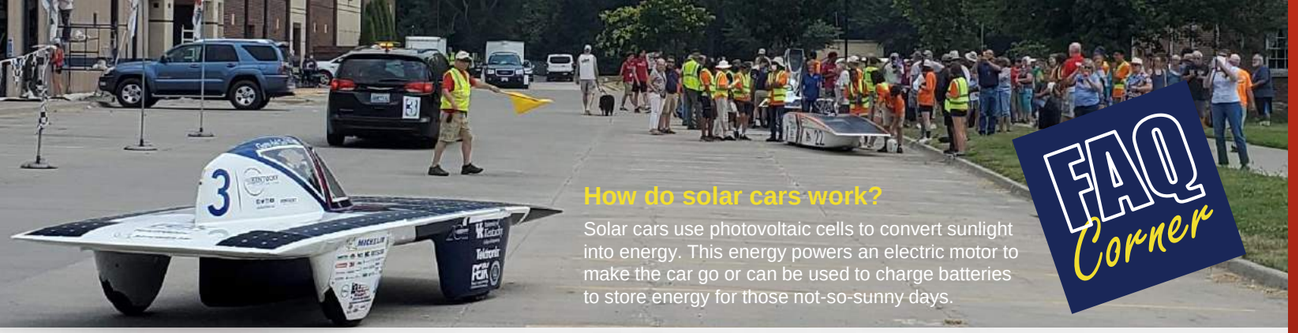
More than road trip, strategic decisions must be made along the way to manage the available solar energy and determine how many optional loops to complete.

While most teams have engineers, you will also find majors in business, marketing, and other fields. The beyond-the-textbook, multi-disciplinary aspect of the solar car experience serves these students well as they prepare for their future careers across a range of industries.

Get Involved!

→ Compete
→ Sponsor
→ Volunteer

Contact us to get started!
ascinfo@americansolarchallenge.org



FAQ Corner

How do solar cars work?

Solar cars use photovoltaic cells to convert sunlight into energy. This energy powers an electric motor to make the car go or can be used to charge batteries to store energy for those not-so-sunny days.

Why do solar cars look so different?

Conventional passenger cars typically use more energy overcoming air resistance, known as aerodynamic drag. Solar cars are designed to minimize the energy lost due to drag, resulting in unique shapes and lightweight designs. Many solar cars include fairings around the wheels to further improve aerodynamics.

Is the first team across the line the winner?

Not necessarily. The winner of the single-occupant vehicle class is determined based on the official mileage completed across all stages of the event, including optional loops and reduced for any penalties incurred. For the multi-occupant vehicle class, additional considerations of energy efficiency and practicality factor into the overall score.

How fast can the solar cars go?

Teams must obey posted speed limits, and regulations limit the cars to 65 mph for the event. During testing, some solar cars have reportedly reached speeds of 100+ mph.

What about cloudy days?

Solar cars carry batteries that can be charged using the solar cells on the car. When facing clouds or needing extra power, the car uses this stored energy. Hence, the solar cars can continue to drive in the clouds and rain, although likely at a slower speed to conserve energy.

Can I buy a solar car?

These solar cars are built specifically for competition; however, there are many EVs and plug-in hybrids that can be bought today and charged from home solar panels.

Do teams pick the lightest driver?

All drivers are ballasted to 80kg for the event, so individual driver weight is not a primary factor. Efficient driving skill is more important.

What are the Optional Loops?

Select stage/checkpoints offer teams the opportunity to drive optional loops to increase their mileage and demonstrate the capabilities of their solar car. Teams are ranked on official distance and then by official elapsed time to complete that distance.

Do the cars have air conditioning?

No. Though teams are required to provide driver ventilation, these vehicles are designed to maximize energy efficiency. Air conditioning, power windows, and other creature comforts would consume electricity without improving the car's performance.

Thank You!

These events would not be possible without the time and dedication of our volunteers before, during, and after the event! We are thankful for their contributions to the solar car community!

Event Staff & Inspectors

Ryan Babaie
Dan Bohachick
Linda Bozarth
John Broere
Brian Call
Calvin Chen
Alain Chuzel
Tyler Coffey
Steve Day
Megan Derwich
Domenic DeVincenzi
Bill Elliott
Sue Eudaly
Kila Henry
Byron Hopps
Ryan Hupp
Byron Izenbaard
Todd Krener
Gail Lueck
Steve McMullen
Jonathan Mullen
Senait Nuguse
Paul Park
Dale Reid
Jeffrey Rogers
Daniel Saulsberry
Stephanie Saulsberry
Alessandro Scola
Evan Stumpges

Observers

Alexander Åberg
Ryan Babaie
Ludvig Brodén
Thomas D'Souza
Keenan Dungey
Kila Henry
Santiago Marzán Rosado
Viktor Neuman
Luis Nieves Colón
Allen Rues
Michael Turrentine
Josef Vernersson
Louise Werner
Zohan Wu
Hossein Zabihian

Jury

Nabih Bedewi
Dan Eberle
Chris Selwood

MOV Practicality Judges

Carol Clark
Ian Girard
Sharon O'Leary
Raleigh Salazar

Special thanks to our event partner, the National Park Service, and the Location Hosts for their help in putting this route and event together.